

Work Order ID 66921

Wednesday, March 02, 2011 2:58:24 PM



Page 1

Item ID: D350-748-101

Accept



Setup Start



Revision ID:

Item Name: Crosstube Installation, High Fwd

Stop



Start Date: 3/2/2011 Start Qty: 1.00



Cust Item ID:

Required Date: 3/23/2011 Req'd Qty: 1.00

Customer:

Reference:

Approvals:

Process Plan:

Handwritten signature

Date: 11-03-2

Tooling:

Date:

QC:

Date:

SPC (Y/N):

Date:

Run Start



Stop



Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
Draw Nbr	Revision Nbr								
D350-748-141	F <i>OK UP</i> 11.11.04								
100		0.00							
	DOCUMENT CONTROL								
DC	Memo	0.00							
Document Control	Photocopy bluefile & type labels per PPPD350-748-101		CHG002						
110		0.00							
	BENDING MACHINE - CROSSTUBES								
CNC Bend 1	Memo	0.00							
CNC Delta 100 Bender	Bend tube as per Dwg D350-748-141 using CNC bender program D350F and Folio FT								
120		0.00							
	QC15- Crosstube Dimensional Check								
QC	Memo	0.00							
Quality Control									

Handwritten: 11-11-04 (1)

Handwritten signature

Handwritten: 11-10-14

Handwritten: 5/10/04

Handwritten: (H)

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____
 Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
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Start Date: 3/2/2011 Start Qty: 1.00



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Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start



QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop



Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

125

0.00



HandFXtube

Memo

0.00

Hand Finishing Crosstubes

Stress relief

Heat treat crosstube as per QSI010 4.3

Temp: 375°

Start time: 4h45

Finish time: 8h45

① S90 11-10-04

127

QC6- Inspect dimensions to drawing

0.00



QC

Memo

0.00

Quality Control

(twist is the same)

8/11/10/05

Dart Aerospace Ltd

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Revision ID:					Stop	
Item Name:	Crosstube Installation, High Fwd					
Start Date:	3/2/2011	Start Qty:	1.00		Cust Item ID:	
Required Date:	3/23/2011	Req'd Qty:	1.00		Customer:	
Reference:						

Approvals:	Process Plan:	Date:	Tooling:	Date:	Run	Start	
	QC:	Date:	SPC (Y/N):	Date:		Stop	

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
130	Crosstubes	0.00							
	Crosstubes								
Crosstubes	Memo	0.00							
	1-Drill Tube as per Dwg D350-748-141 Using DT8876 A,B &C Drill Jigs, Set-up drill table as per QSI 010								
	2-Deburr								
	3-Engrave Part # and Batch # as per Dwg D350-748-141								
	4-Remove all marks from tube within limits of D350-748-141								
	5- Apply a light coat of LPS3 on the interior of tube Batch: <u>M109956</u>								
140	QC5- Inspect part completeness to step on W/O	0.00							
	QC								
Quality Control	Memo	0.00							
	CHECK 10 DEG HOLES WITH DT8876E (EUROCOPTER CLAMP)								

Handwritten notes:
 85 11-10-05
 MO/AN 11-10-06

Handwritten signature: S. Valdez

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

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Customer:

Reference:

Run Start



Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Stop



QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
150 	Outsource process-Cadplate per QSI017 4.1.9.1	0.00							
Outsource3	Memo	0.00							
Outsource process - Cad plate	Issue P/O: <u>15117</u> Stress relief at 375° for 5 hours Magnetic Particle Inspect per ASTM E1444 Cadium Plate per AMS-QQ-P-416B, Class 1, Type 2 Embrittle relief at 375° for 8 hours, Chromate Treat Possible Supplier: Southwest United Industries Ensure Certificate of Conformity is attached								
160 	Receive & Inspect for Damage & Mat'l Certs	0.00							
Packaging	Memo	0.00							
Packaging	Ensure certificate of conformity is attached								
170 	QC5- Inspect part completeness to step on W/O	0.00							
QC	Memo	0.00							
Quality Control									

11-10-4

★ SEE W/O CHG ATTACHED

11-11-10 ①

11-11-10 ①

PRO

11-11-10 ①

issue P/O to Acuren for NDT as per QSI 038 P/O. 15359 C&U/11/03 ①

rec'd + inspect and attached full report of NDT to W/O

11-11-10 ①

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Dart Aerospace Ltd

W/O: 66921		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	
11.10.05	161	LOAD TUBE TO 3500 ^{lb} FOR 1 MINUTE. REF D.S. EMAIL. BIN 66921	CP	11/11/01	1	CP 11.11.01 Q51042	M/M 11/11/03	
11.10.05	162	NDT TUBE.				CP 11.11.01 Q51042	M/M 11.11.03	

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Chris Provencal

From: David Shepherd <dshepherd@dartaero.com>
Sent: Tuesday, April 27, 2010 3:40 PM
To: 'Mike Petsche'
Cc: 'Bill Beckett'; 'L Lacelle'; 'Chris Provencal'; 'Dan Stow'; ssheldon@dartaero.com
Subject: 350 crosstubes

Mike,

I discussed the 350 crosstube load testing with Bill a little while ago and this plan makes sense to him.

So, my recommendation to clear these crosstubes is to load the fwd crosstubes to 3500 lb and the aft crosstubes to 3000 lb in the deflection test rig and document on the work orders that this test has been completed. Hold max load for 1 minute. Per TP-D350-748-2, these loads represent the maximum load on these crosstubes at gross weight and are below the yield point of the material. I would like to request that Chris Provencal witness these tests and sign off the work orders based on his experience with Dart landing gears. My feeling is that if there is a problem with the parts, it will manifest itself during this load test. I, for one, would feel a lot more confident in testing each crosstube in this manner than relying totally on what Exova has to say. I think it would be very difficult to reach a conclusion on the whole batch on the basis of cracks in two parts from the batch.

I believe that we can accomplish this before next Friday, which also gives us time to hear what Exova has to say in case it has an impact on our decision. So far, what I have seen from Exova shows me that there are fluctuations in the heat treating but the tubes are heat treated to our specification.

For this reason, I believe we should tell DHS that it looks like we will be able to start shipping 350 crosstubes by May 7th pending a successful Engineering test of the material.

David.

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Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____
QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Run Start



Stop



Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
180 SprayPaint Spray Painting	SprayPaint Memo 1-Prime inside crosstube as per QSI 005 4.2 2-Prime Outside of Tube as per Dart QSI 005 4.2	0.00 0.00							85 11-11-03
190 QC Quality Control	QC14- Inspect Spray Paint Memo Then, Wrap in plastic bag to protect from scratches	0.00 0.00							11-11-04 (1)
200 Crosstubes Crosstubes	Crosstubes Memo 1-Install Ground wire Insert, then insert screw and washer 2-Install Abraison strips as per Dwg D350-748-141 & QSI 035. 3-Install supports Using Dt8876 as per Dwg D350-748-141, Torque to 60-80 IN-LBS	0.00 0.00							11-11-04

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QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Run Start



Stop



Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
210 QC Quality Control	QC5- Inspect part completeness to step on W/O Memo	0.00 0.00				<u>11</u>	<u>11</u>	<u>11</u>	<u>04</u> (1)
220 Packaging Packaging	Pick Kit Memo	0.00 0.00							<u>Sp 11-11-04.</u>
230 QC Quality Control	QC4- 100% Inspect kits for completeness Memo	0.00 0.00				<u>11</u>	<u>11</u>	<u>04</u>	(1)

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Cust Item ID:

Required Date: 3/23/2011 Req'd Qty: 1.00



Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start



QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop



Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
240	Packaging	0.00							
Packaging	Memo	0.00							
Packaging	Identify and pack for shipping as per PPP D350-748-101 Location: _____ PPP Rev: _____								
250	QC21- Final Inspection - Work Order Release	0.00							
QC	Memo	0.00							
Quality Control									

Signature

CK 11/11/04

MF 11-11-04

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

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Parent Item Name: Crosstube Installation, High Fwd

Required Date: 3/23/2011

Required Qty: 1.00

Comments: IPP Rev:A New Issue 06-07-05 JLM
IPP Rev:B Update qty of MS21042L5 06-09-12 KJ
IPP Rev:C Rev B 07-11-15 DD
IPP Rev D Combined manufacturing 08.04.02 EC verified by: DD
IPP Rev:E 08-06-24 revD as per dwg DD verified by:EC IPP Rev:F
10.08.04 added QSI010 4.3 DD verf:EC

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D350-748-141TRN		Manufactured	No			110	Each	0.0000	1	1			
													
<div style="display: flex; justify-content: space-between;"> B77814  </div>													
Crosstube Turning Detail													
ALS4-1032-225		Purchased	No			200	Each	3,839.000	1	1			
													
<div style="display: flex; justify-content: space-between;"> 108696  </div>													
Insert													
				<u>Location</u>		<u>Loc Qty</u>		<u>Loc Code</u>					
				PK011		3839							
				110768		3839							
AN960JD10	NAS1149D0363J	Purchased	No			200	Each	24.0000	1	1			
													
<div style="display: flex; justify-content: space-between;"> 118612  </div>													
Washer													
				<u>Location</u>		<u>Loc Qty</u>		<u>Loc Code</u>					
				ST		6							
				107715		6							
				ST335		18							
				105792		2							
				112279		16							

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Work Order ID: 66921

Parent Item: D350-748-101

Parent Item Name: Crosstube Installation, High Fwd

Start Date: 3/2/2011

Required Date: 3/23/2011

Start Qty: 1.00

Required Qty: 1.00

D2856-400

Manufactured No

200 f

158.4380

1.181

1.243158



Abraison Strip

71164



BT

11-11-04

Location

Loc Qty

Loc Code

ST403

158.4380421

56626

0.00004211

59920

43.381

63735

115.057

D3502-1

Manufactured No

200 Each

32.0000

2

2



Support

68951



BT

11-11-04

Location

Loc Qty

Loc Code

ST063

32

52903

1

61206

12

61843

9

64004

10

MS21920-20

Purchased No

200 Each

61.0000

2

2



Clamp (per MIL-DTL-8783C)

118649



BT

11-11-04

Location

Loc Qty

Loc Code

LG

61

112624

2

114687

1

115736

8

116799

50

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Start Date: 3/2/2011

Required Date: 3/23/2011

Start Qty: 1.00

Required Qty: 1.00

MS27039-1-10

Purchased

No

200

Each

84.0000

1

1



Screw

118612



RT 11-11-04

Location

Loc Qty

Loc Code

ST291

84

112794

3

115935

81

AN4-41A

Purchased

No

220

Each

200.0000

8

8



Bolt



SP 11-11-04

Location

Loc Qty

Loc Code

ST360

200

115108

100

115705

50

116191

50

AN4-6A

Purchased

No

220

Each

1,674.000

16

16



Bolt



m118628.sp11-11-04.

Location

Loc Qty

Loc Code

ST356

1674

112933

96

113149

17

115108

8

115457

253

115936

200

116191

300

116400

400

116924

400

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Start Date: 3/2/2011

Required Date: 3/23/2011

Start Qty: 1.00

Required Qty: 1.00

AN5-32A

Purchased

No

220

Each

149.0000

4

4



Bolt



m118422 SP

Location

Loc Qty

Loc Code

ST340

149

115016

38

115108

50

115589

60

115698

1

AN960JD416

NAS1149D0463J

Purchased

No

220

Each

30.0000

32

32



Washer



m119097 SP 11-11-04

Location

Loc Qty

Loc Code

ST300

24

113288

24

ST356

6

115622

6

AN960JD516

NAS1149D0563J

Purchased

No

220

Each

34.0000

8

8



Washer



m118206 SP 11-11-04

Location

Loc Qty

Loc Code

ST

34

103694

18

107534

12

109287

4

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Start Date: 3/2/2011

Required Date: 3/23/2011

Start Qty: 1.00

Required Qty: 1.00

D3500-1

Manufactured No

220

Each

37.0000

4

4

Saddle

Location

Loc Qty

Loc Code

ST243

20

62207

20

ST424

2

55605

2

ST425

15

61838

15

D3501-1

Manufactured No

220

Each

202.0000

16

16

Bushing

Location

Loc Qty

Loc Code

ST063

202

45402

15

45918

112

48268

3

53779

5

61984

67

MS21042L4

Purchased No

220

Each

4,871.000

24

24

Nut

Location

Loc Qty

Loc Code

ST300

4871

1123143

2

115589

10

115621

20

116188

2839

116823

2000

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Parent Item Name: Crosstube Installation, High Fwd



Start Date: 3/2/2011

Required Date: 3/23/2011

Start Qty: 1.00

Required Qty: 1.00

MS21042L5

Purchased

No

220

Each

998.0000

4

4



Nut



m118910 sp11-11-01

Location

Loc Qty

Loc Code

ST139

26

114813

26

ST300

972

115594

276

116105

496

116548

200

Wednesday, March 02, 2011 2:58:32 PM

Shop Packet Print

Page 6

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

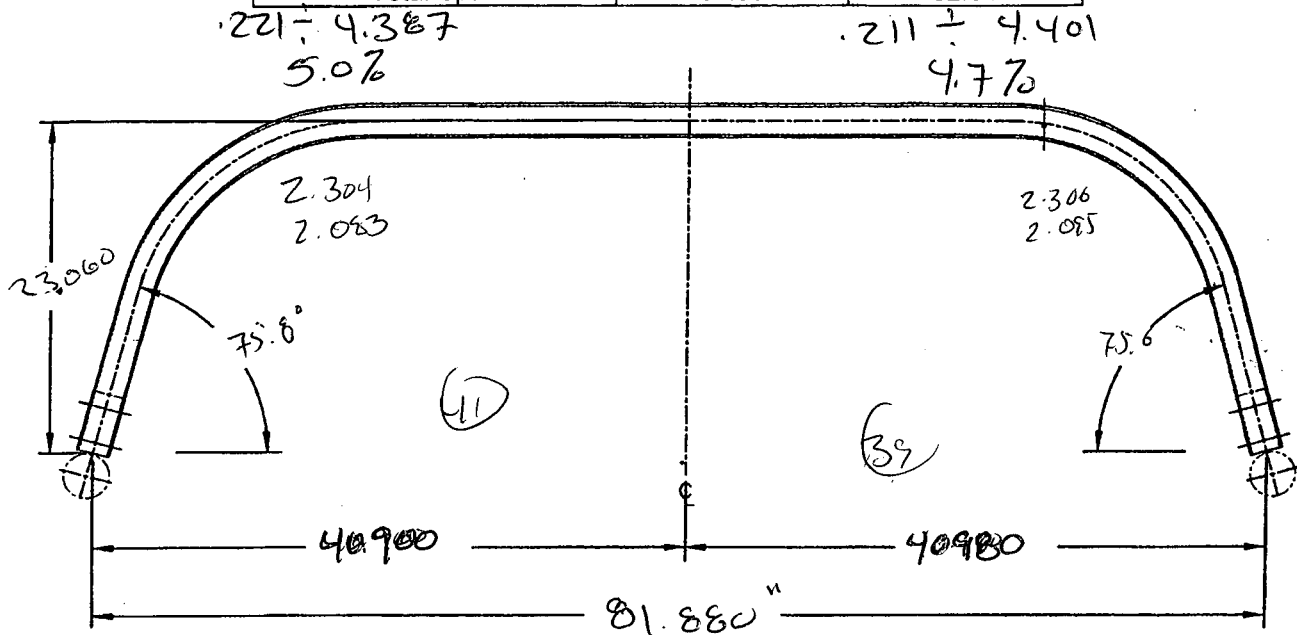
Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

DART AEROSPACE LTD		Work Order:	116 921
Description: Crosstube High Fwd (AS350/355)		Part Number:	D350-748-101
Inspection Dwg: D350-748-141 Rev: E		Page 1 of 1	

Required Dimension	Min	Max
Height	23.13	23.37
1/2 Span	40.78	41.02
Angle	75	77
Total Span	81.56	82.04



Comments
twist = 0-355"
side A = 5.0% crushing @ 41 Passes
side B = 4.7% crushing @ 39 Passes
Bent low & twist high, Acceptable. DS1042 CP11.10104

QC15 Inspection	δ
Date	11/10/07

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

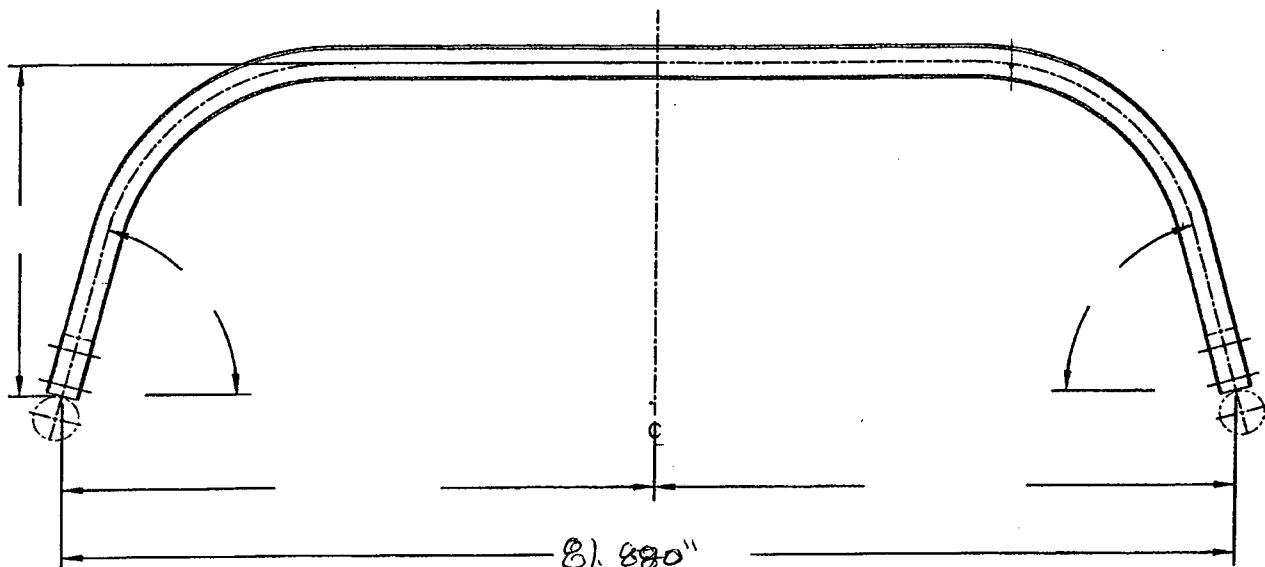
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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

DART AEROSPACE LTD		Work Order:	68921
Description: Crosstube High Fwd (AS350/355)		Part Number:	D350-748-101
Inspection Dwg: D350-748-141	Rev: E	Page 1 of 1	

For stress relief only

Required Dimension	Min	Max
Height	23.13	23.37
1/2 Span	40.78	41.02
Angle	75	77
Total Span	81.56	82.04



For Stress Relief only

Comments
Twist = 0.310"

QC15 Inspection	8
Date	11/10/05

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	

11/10/05

Item	Qty	Part Number	Description
	-141		
1	X	D350-748-141	CROSSTUBE ASSEMBLY (AS 350/355 HI FWD)
2	1	D6015-125	CROSSTUBE (OR D6017-115)
3	2	D3502-1	SUPPORT
4	2	D2856-400-710	ABRASION STRIP
5	1	AELS-1032-225	INSERT
6	1	NAS1149D0363J	WASHER (OR AN960JD10)
7	2	MS21920-20	CLAMP (PER DART SPEC. M-MS21920-20)
8	1	MS27039-1-10	SCREW

GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6015-125 OR D6017-115
FINISHED LENGTH = 110.270±0.06
- 2) FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2
CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: DART PART NUMBER 'D350-748-141' AND BATCH NUMBER ON INSIDE OF CUFF
PER DART QSI 044 6.4 (VIBRATING STYLUS)
- 7) WEIGHT: 30.45 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.297 HOLE.
- 9) BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
NOTE: ALL HOLES ARE DRILLED AFTER BENDING.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO
BENDING IS 6% BASED ON O.D.
- 11) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING. ACCEPTABLE TO
VERIFY TENSILE STRENGTH BY HARDNESS TEST PER ASTM E18 TO 40-45 HRC.
- 12) INSTALL D2856-400-710 ABRASION STRIPS WITH A GAP ON BOTTOM SIDE OF CROSSTUBE,
CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
- 13) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE
OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES,
NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY.
CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE
MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO
CRACKING/CHIPPING/GROOVES.
- 14) TORQUE CLAMPS 60 TO 80 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT
NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.
- 15) MAX TWIST AFTER BENDING: WITH XTUBE LAYED FLAT ON SURFACE, THE DIFFERENCE BETWEEN
CUFF HEIGHTS FROM THE SURFACE MAY BE NO LARGER THAN 0.25 (ZN C1-3).

SHOP COPY
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UNCONTROLLED COPY
SUBJECT TO AMENDMENT
WITHOUT NOTICE
WORK ORDER

NO. 10-6629
M11-03-2

RELEASED
2011-01-18

F	ADD HRC TEST OPTION (B8-1) PER PAR 09-040, ADD TWIST LIMIT (A8-1, C1-3), ADD D6015-125 OPTION (C8-1), STOCK DIM NOW MACHINED (D1-4)	CP	10.11.23
E	REVISE GENERAL NOTES; UPDATE TO CURRENT ADD STANDARDS; RELOCATED FLAG #6 PER PAR 08-046 (ZN A8-3); TOLERANCES (ZN C8-3, D1-3)	RF	09.09.30
D	MAG. PARTICLE AND CAD PLATE AS MFD.	CP	06.10.31
C	ADD CAD PLATING	CP	06.08.14
B	ADD D6017-115 & PRIME AND PAINT	CP	06.06.30
A	NEW ISSUE	CP	06.03.31
REV.	DESCRIPTION	BY	DATE
DESIGN			
DRAWN			
CHECKED			
MFG. APPR.			
APPROVED			
DE APPR.			
DATE	10.11.23		

DART AEROSPACE LTD
HAWKESBURY, ONTARIO, CANADA

DRAWING NO. REV. F
D350-748-141 SHEET 1 OF 4
TITLE SCALE
CROSSTUBE (AS 350/355 HI FWD) NTS

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Dart Aerospace Ltd

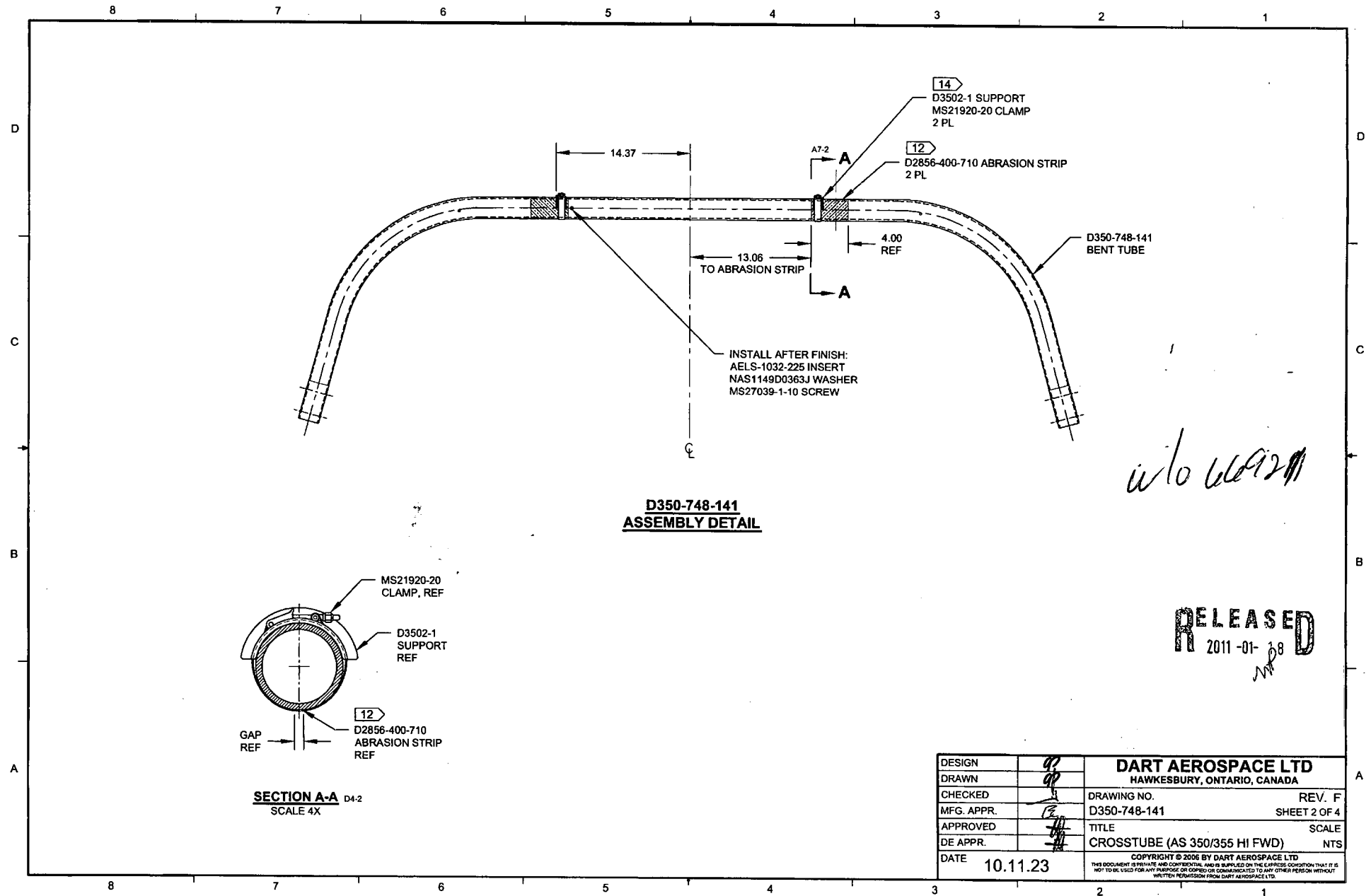
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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries



W/O:		WORK ORDER CHANGES					
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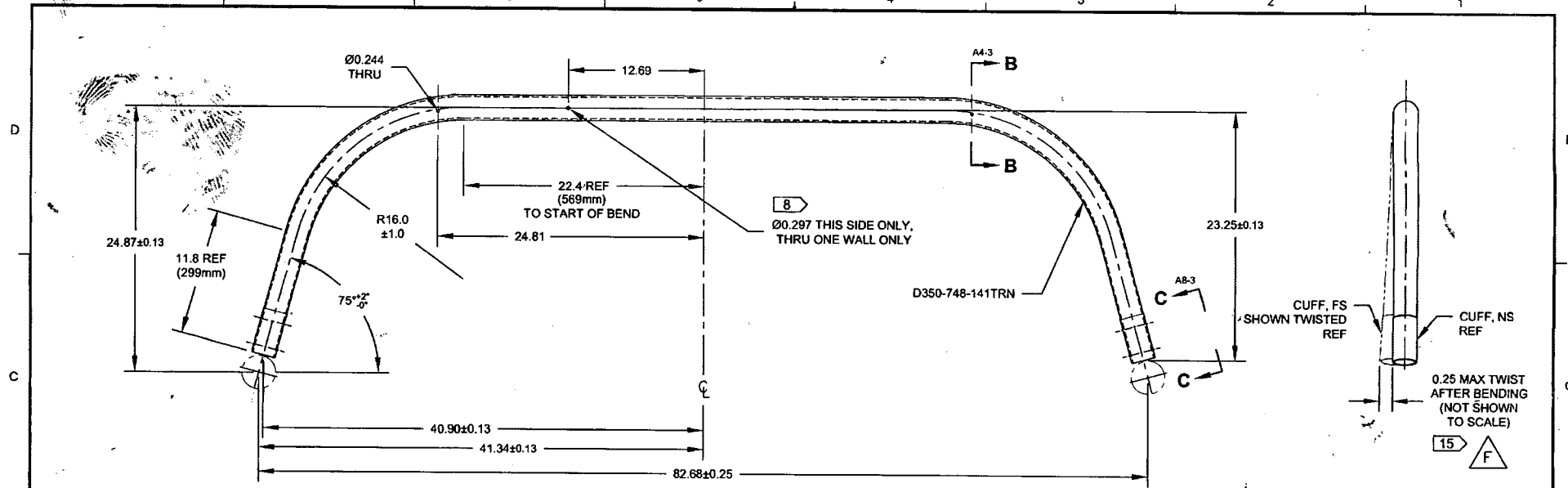
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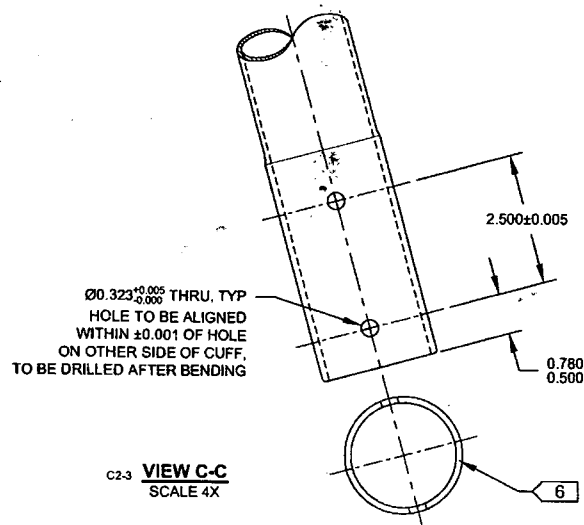
NOTE: Date & initial all entries

8 7 6 5 4 3 2 1

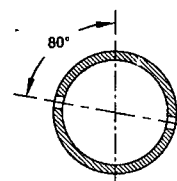


D350-748-141
BENDING AND DRILLING DETAIL 10

u/060921



VIEW C-C
SCALE 4X



SECTION B-B D3-3
SCALE 4X

RELEASED
R 2011-01-18

DESIGN	97	DART AEROSPACE LTD	
DRAWN	97	HAWKESBURY, ONTARIO, CANADA	
CHECKED	13	DRAWING NO.	REV. F
MFG. APPR.	3	D350-748-141	SHEET 3 OF 4
APPROVED	14	TITLE	SCALE
DE APPR.	14	CROSSTUBE (AS 350/355 HI FWD)	NTS
DATE	10.11.23	<small>COPYRIGHT © 2006 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL, AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.</small>	

8 7 6 5 4 3 2 1

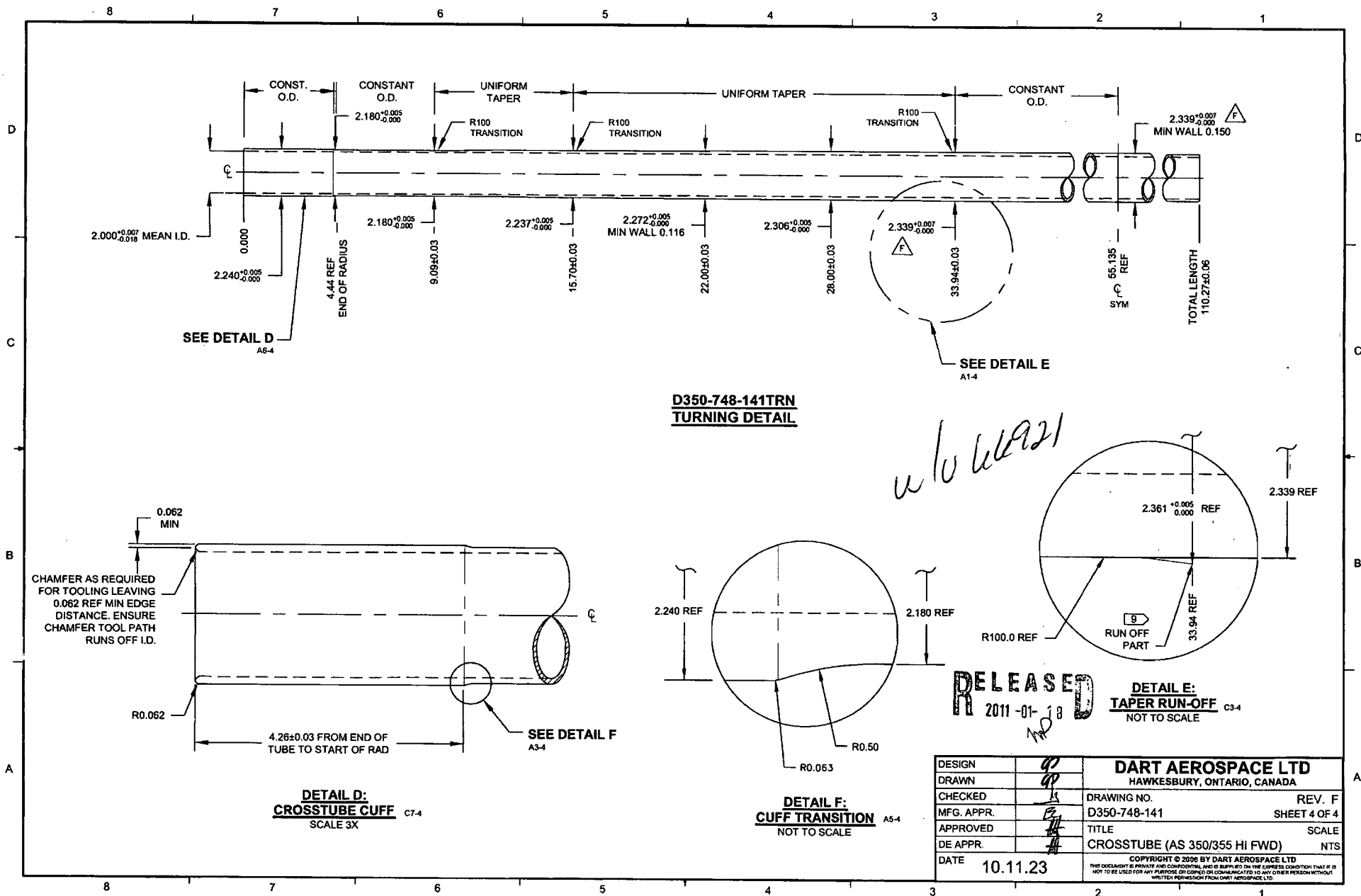
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NOTE: Date & initial all entries



DESIGN	40	DART AEROSPACE LTD	
DRAWN	40	HAWKESBURY, ONTARIO, CANADA	
CHECKED	13	DRAWING NO.	REV. F
MFG. APPR.	13	D350-748-141	SHEET 4 OF 4
APPROVED	13	TITLE	SCALE
DE APPR.	13	CROSTUBE (AS 350/355 HI FWD)	NTS
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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

**CERTIFICATE OF
CONFORMANCE**

**CADORATH PLATING CO. LTD.
2150 LOGAN AVENUE
WINNIPEG, MANITOBA R2J-0J1**

DATE: Oct-28-2011

CONSIGNED TO: Dart Aerospace Ltd.
1270 Aberdeen St.
Hawksbury, ON K6A 1K7

W/O #: 108672

INVOICE #: 57422

**CONTRACT OR
PURCHASE ORDER #** 15117

DESCRIPTION: SKID

QTY 1

P/N # d350-748-101

S/N # B66921

STRESS RELIEF @ 375 DEG. 5 HRS BAKE HEAT CHART # 11-1084.
MPI INSPECTED IAW ASTM-E-1444. CADMIUM PLATED IAW AMS-
QQ-P-416C, TYPE 2 YELLOW, CLASS 1. HYDROGEN
EMBRITTLEMENT @ 375 DEG. 8 HRS. BAKE HEAT CHART #11-1095.

CERTIFICATE: I certify that the items indicated here on have
been inspected and tested and conform to all specifications
and requirements detailed on the contract or purchase order.

Approved Inspector:



A large, stylized handwritten signature in black ink.



RAPPORT D'INSPECTION PAR RESSUAGE

P-11134

NT Dart Aerospace DATE 3 novembre 2011 PAGE 1 DE 2
INTION Rue Linda Lincolne N° TRAVAIL 188-11-02386 HEURE AM ☒ PM ☐
ESSE 1270 Aberdeen St. N° CLIENT PO/WO 15359
Hawkesbury, Ont. K6A 1K7 SITE DE TRAVAIL Dart Usine
ACCEPTATION STD. ASTM A47/AS1038 DATE/RÉV. 2005
JET Crosstubes inspection (Fluorescent Penetrant)
(S) EXAMINÉ 12 x crosstubes (5x steel, 7x Aluminium)

DESCRIPTION DES TRAVAUX N° PROCÉDURE LT-002 DATE/RÉV. 2007 N° TECHNIQUE LT-002 DATE/RÉV. 2007
REMS See other sheet MATÉRIEL Steel - Aluminium ÉPAISSEUR
DESCRIPTION Inspection 100% Fluorescent on surface external
on 12 x crosstubes.

MÉTHODES DES INSPECTIONS

MÉTHODE : ☒ FLUORESCENT ☐ VISIBLE ☐ LAVABLE À L'EAU ☐ MÉTHODE DISSOLVANT ☐ PRÉ-ÉMULSIONNANT
MARQUE : Magnaflux LUM. NOIRE S/N 16440 ☐ PUISS. > 1000 μ W/cm² ☐ AMBIANT < 2 fc
ÉQUIPEMENT : 2400 ZL 67 TEMPS PÉNÉTRATION MIN. 10 MIN. ÉQUIP. LUMIÈRE ☐ LAMP. POCHÉ ☐ LAMP. CULASSE ☐ PUISS. > 100 fc @ SURFACE
SOLVANT PÉNÉTRANT H2O TEMPS SÉCHAGE MIN. >10 MIN. AUTRES Modelo Labino
OPÉRATEUR SKD 52 TEMPS PÉNÉTRATION MIN. 10 MIN. MÈTRE LUM. N/S DATE CAL DUE
RÉVÉLATEUR ☒ NON AQUEUX ☐ AQUEUX ☐ SEC

SURFACE INSPECTÉE

PRÉPARATION SURFACE ☐ MEULÉE ☐ SOUDÉE ☐ MACHINÉE ☐ GRENAILLÉE ☒ MÉTAL PROPRE
TEMPÉRATURE SURFACE ☐ < - 4°C/ 20°F ☐ - 4°C/ 20°F DE 10°C/50°F ☒ 10°C/50°F DE 52°C/125°F ☐ > 52°C/125°F

RÉSULTATS- (☐ MÉTRIQUE ☐ IMPÉRIAL)

See other sheet
For Results

11-11-13

Limites des Services
L'entreprise Acuren Inc. exécute les services ne concerne que les énoncés par écrit. En aucune circonstance ces services ne s'étendent au-delà de l'exécution des services demandés. Il est entendu que toutes les observations, les observations et les expressions d'opinions faites par Acuren reflètent les opinions ou les observations de l'entreprise fondées sur l'information et les hypothèses fournies par le propriétaire/opérateur, et elles ne constituent pas des déclarations ou des garanties ou ne peuvent être interprétées comme constituant. Le Groupe Acuren Inc. n'assume aucune des responsabilités du propriétaire/opérateur, et le propriétaire/opérateur conserve la responsabilité des décisions prises en matière d'ingénierie, de fabrication, de réparation et d'usage à partir de l'information ou des données fournies par Acuren en rapport avec les services décrits dans les présentes ne peuvent excéder le coût des services rendus.

Degré de Diligence
L'exécution des services, le Groupe Acuren Inc. applique le degré de diligence, le soin et la compétence normalement exercés dans des circonstances semblables par d'autres fournisseurs de ce type de services opérant dans la même zone ou dans une localité similaire. Aucune autre garantie, implicite ou explicite, n'est faite ou voulue par le Groupe Acuren Inc.

NATURES

RÉPRÉSENTANT Ken Tittle FTJ#
TECHNICIEN (SIGNATURE) Pierre-Luc Debour RAPPORT RÉVISÉ PAR:
1^{ER} TECHNICIEN 2 2^{ÈME} TECHNICIEN 2
ONGC NIVEAU 2 SNT NIVEAU 2 ONGC NIVEAU 2 SNT NIVEAU 2
ONGC N° REG. 12205 ONGC N° REG. 12205



RAPPORT D'ESSAI NON DESTRUCTIF

RAPPORT #

P 11134

(SUITE)

PAGE 2 DE 2

CLIENT DART AEROSPACE DATE 2 novembre 2011 HEURE 8 AM ☐ PM
ATTENTION Mme Linda Lucelle NO. TRAVAIL ACUREN 188-11-02386
RÉSULTATS ☐ METRIQUE ☐ IMPÉRIAL

STEEL Crosstubes:

Work order ID	Item ID	D350-748-101
1 " " " 74646	" " "	" " "
2 " " " 74646	" " "	" " "
3 " " " 66921	" " "	" " "
4 " " " 66924	" " "	" " "
5 " " " 74658	" " "	" " "

Aluminium Crosstubes:

Work order ID	Item ID	D 212-664-101
1 " " " 75603	" " "	" " "
2 " " " 75604	" " "	" " "
3 " " " 75800	" " "	D 212-664-207
4 " " " 75801	" " "	" " "
5 " " " 75985	" " "	D 212-664-201
6 " " " 75417	" " "	D 412-664-203
7 " " " 75416	" " "	" " "

- All the Crosstubes (12) Accepted
- No linear indication as found

Étendue des Services

L'entente selon laquelle le Groupe Acuren Inc. exécute les services ne concerne que les énoncés par écrit. En aucune circonstance ces services ne s'étendent au-delà de l'exécution des services demandés. Il est entendu que toutes les descriptions, les observations et les expressions d'opinions faites par Acuren reflètent les opinions ou les observations de l'entreprise fondées sur l'information et les hypothèses fournies par le propriétaire/opérateur, et elles ne constituent pas des déclarations ou des garanties ou ne peuvent être interprétées comme constituant. Le Groupe Acuren Inc. n'assume aucune des responsabilités du propriétaire/opérateur, et le propriétaire/opérateur conserve la responsabilité entière des décisions prises en matière d'ingénierie, de fabrication, de réparation et d'usage à partir de l'information ou des données fournies par Acuren en rapport avec les services décrits dans les présentes ne peuvent excéder le coût des services rendus.

Norme de Diligence

Dans l'exécution des services, le Groupe Acuren Inc. applique le degré de diligence, le soin et la compétence normalement exercés dans des circonstances semblables par d'autres fournisseurs de ce type de services opérant dans la même localité ou dans une localité similaire. Aucune autre garantie, implicite ou explicite, n'est faite ou voulue par le Groupe Acuren Inc.

SIGNATURES

REPRÉSENTANT
À LA CLIENTÈLE

Icon Titley

SIGNATURE

FTJ #:

TECHNICIEN (SIGNATURE)

NAME (MOULÉE):

France-Lee Dufour

1^{er} TECHNICIEN2^e TECHNICIENRAPPORT
REVISÉ PAR:

NIVEAU CGSB

2 NIVEAU SNT

NIVEAU CGSB

NIVEAU SNT

NOM

INITIALES

No. ENREG. CGSB

12205

No. ENREG. CGSB